IL12 - Multiple scale analysis of genetic diversity in sorghum

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Crop species are characterised by their intimate association with human populations, their history and their practices and needs. In long domesticated crops, migration can have expanded gradually within continents and jumped between continents, shaping global patterns of diversity and adaptation. Sorghum (*Sorghum bicolor bicolor*) is one such case of very successful crop, which was domesticated in Subsahelian Africa and is now grown throughout the world. Here we review conclusions of recent studies conducted at various geographical scales (field, village, region, country, continent), sometimes including temporal variation, and practised at the level of morpho-agronomic traits, whole-genome molecular markers as well as selected candidate genes.

Local diversity in the area of sorghum origin is almost as large as whole-species diversity, with peripheral regions displaying specific genotypic combinations corresponding to distinct races, but very limited specific genic diversity. This pattern of diversity is accompanied with a generally low level of linkage disequilibrium, which is confined to genome segments within the Mb range.

A focus on certain genes involved in cereal grain quality revealed cases of novel alleles that appeared during the course of migration outside the centre of origin, being likely selected by the action of the farmers, highlighted the potential of neo-diversity for crop diversification.

The diversity of human groups acts together with the agro-ecological factors to shape the structure of sorghum genetic diversity. As detailed in a village in Cameroon, introgression occurs among weedy types and cultivated types, yielding an array of intermediates; farmers identify and name them, and actively select against certain morphotypes, but several practices unconsciously favour gene flow. Based on a study covering 79 villages in Niger, no genetic erosion occurred over a 26 year period; farmers' management can preserve the diversity despite recurrent and severe drought periods and major social changes.

The tremendous diversity maintained by farmers in traditional agroecosystems of Western Africa supports the development of crop improvement approaches making broad use of local germplasm in decentralized breeding programs.